

IMAGE SENSOR WITH CHARGE RECYCLING

ABSTRACT OF THE DISCLOSURE

An image sensor having a circuit to recover photo-generated charge and to apply it to reduce consumption of power from a power supply (e.g., an external battery). In one embodiment (e.g., Fig. 4), the image sensor has at least one light-sensing photoelement implemented in an integrated circuit and adapted to be powered by a power supply, other circuitry that consumes power during a standby operating mode for the image sensor, and a circuit configured to selectively connect the photoelement to the power-consuming circuitry. During the image sensor's standby mode, the photoelement is configured to supply at least a portion of the standby current to the power consuming circuitry. In another embodiment (e.g., Fig. 3), the image sensor has a storage device (e.g., a capacitor), and a circuit configured to selectively connect the storage device to the photoelement or to the power-consuming circuitry. During the reset step of the image sensor's normal operation mode, the storage device is configured to collect charge generated within the photoelement during the integration step of the image sensor's normal operation mode. This charge is then applied to the power-consuming circuitry during a standby mode for the image sensor, thus reducing power consumption by that circuitry from the power supply. The present invention improves power efficiency for the image sensor, which is important for portable and embedded applications.